

APPENDIX C WEED MANAGEMENT, RECLAMATION, AND REVEGETATION PLAN

THIS PAGE INTENTIONALLY LEFT BLANK.

WEED MANAGEMENT, RECLAMATION, AND REVEGETATION PLAN

A. WEED MANAGEMENT

As stipulated in the Chapter 2 project design features (PDFs), and other pertinent special use authorizations, NorthWestern Energy (NorthWestern) shall control noxious weeds within the transmission line right-of-way (ROW), designated decking and staging areas, and access routes on National Forest System (NFS) lands.

Weed Management Plan – In consultation with the US Forest Service (Forest Service), NorthWestern will submit a site specific Weed Management Plan to be incorporated into the special use permit for the transmission line upgrade. The purpose of the plan is to ensure that the Forest Service is informed and approves all treatments prior to implementation on NFS lands. Also, the purpose of the plan is to help facilitate an effective treatment while minimizing conflicts with other resource values.

Information needed to be addressed in the approved weed management plan includes:

1. List the specific weeds targeted for treatment;
2. List the herbicide, surfactant and equipment that will be used;
3. Who is applying the herbicide, what is the applicator's license number, proof of liability insurance, contact phone numbers;
4. Specifically state when and where is the work being implemented;
5. Identify special concerns and mitigation measures (sensitive environmental issues, social concerns, safety concerns, timing constraints due to other activities in the area, authorization for use of vehicle off established roads – the Forest Service can help identify some of these issues);
6. How to document and report use of herbicides to the Forest Service (see attached example form below);
7. How to monitor the effectiveness of the treatment;
8. List any follow-up activities that may need to occur (where to post signs, who to notify regarding herbicide application, etc.).

Table 1 below identifies noxious weed control measures that must be part of the Weed Management Plan.

TABLE 1 MITIGATION MEASURES THAT WILL BE IMPLEMENTED FOR THE USE OF HERBICIDES

MITIGATION MEASURES	
1.	All herbicide treatments will be documented on a pesticide record and treatment areas mapped. Forms and maps will be submitted to the Gallatin National Forest (GNF) by September 1, annually for the life of the Special Use Permit (SUP). Minimum information needs to include: applicators name and license; date, location and map of treatment area; chemical name, concentration rate, amount of chemical applied; wind; temperature; species treated; and effectiveness of treatment. An example of a suitable form is included in this appendix.
2.	NorthWestern will immediately report to the GNF if there is any herbicide spill (more than five gallons mixed or concentrated), unplanned non-target pesticide application, unusual occurrence of drift, unforeseen effects on wildlife or other resources, or any other situation that may affect public welfare. Herbicide clean-up and disposal is the responsibility of NorthWestern and will comply with all federal, state, and county requirements. NorthWestern or their contractor will possess a spill kit that includes the following items as a minimum: shovel, 10 pounds of absorbent material, large plastic garbage bags, rubber gloves, protective overalls, and rubber boots. The herbicide applicator will be covered by at least a one million dollar liability insurance policy or self-insure for the equivalent amount.

MITIGATION MEASURES

3. NorthWestern will work with the GNF to ensure sensitive areas (sensitive plants or amphibians, or newly seeded areas) are avoided and herbicide active ingredients do not exceed maximum quantities for any given watershed in the GNF, as specified in the GNF Noxious and Invasive Weed Treatment Project Final Environmental Impact Statement (FEIS)/Record of Decision (ROD) (Forest Service 2005). If weeds need to be treated in or near sensitive areas, alternative treatment measures will be used, including hand pulling, herbicide application using backpack sprayers or wick applicator and a selective herbicide.
4. Use only herbicides approved by the GNF. A list of approved herbicides is provided below.
5. When mixing and applying pesticides, adhere to the herbicide label for protective equipment, re-entry period, and environmental protection constraints
6. Post treated areas with appropriate signs at common public access areas and observe restricted entry intervals specified by the product label. Contact relevant parties before herbicide treatment occurs less than 100 feet from human residences, recreationists, or livestock.
7. All mixing of pesticides will occur at least 100 feet from surface waters or well heads. Do not contaminate open water or ground water with herbicides. Do not spray herbicide into, on or over open water or within 10 feet of ground water.
8. Picloram will not be used within 50 feet from wetland/riparian areas and/or intermittent or perennial streams, rivers, lakes, or other water bodies. Surfactants used within 50 feet of water or within sub-irrigated land need to be labeled for use within or adjacent to water
9. All motorized equipment used off established roads will be power washed and inspected, to remove plant material and soil, prior to bringing the equipment onto the National Forest.
10. NorthWestern shall map and treat existing weeds before construction. Treat all existing weeds impacted by this project at the appropriate time to maximize effectiveness of treatment, prior to any ground disturbance. Re-treat the weeds if previous treatments were not effective at killing the weeds. The expectation is that the treatments would be highly effective at killing the existing weeds so that the weeds are dead and will not be spread along the transmission line corridor.
11. After construction, NorthWestern will continue to treat weeds annually, and monitor the effectiveness of the treatment as long as weeds persist in the ROW and access routes. For areas with temporary disturbance caused by the installation of the new transmission line, NorthWestern will treat weeds annually until the areas are weed-free for five consecutive years and the area has been successfully re-vegetated. NorthWestern will remap and inventory weed populations every five years, or as necessary, for the life of the permit.

Weed Species List

This list is frequently revised to reflect new species of concern, so this project/special use permit will use the most current species list as revised. The list below includes all potential weed species in Montana and does not reflect the exact species in the project area, which would be a much smaller subset of this list.

TABLE 2 WEED SPECIES LIST

SPECIES NAME ^{1,2}	SPECIES BACKGROUND ¹		
	LIFE SPAN	GROWTH HABIT	REPRODUCTIVE MECHANISMS
Russian knapweed <i>Acroptilon repens</i>	perennial	forb	rhizomes, seeds
scentless chamomile <i>Anthemis arvensis</i>	annual	forb	seeds
golden chamomile <i>Anthemis tinctoria</i>	perennial	forb	seeds
Burdock <i>Arctium spp.</i>	biennial	forb	seeds
hoary alyssum <i>Berteroa incana</i>	annual, biennial	forb	seeds

SPECIES NAME ^{1,2}	SPECIES BACKGROUND ¹		
	LIFE SPAN	GROWTH HABIT	REPRODUCTIVE MECHANISMS
cheatgrass <i>Bromus tectorum</i>	annual	grass	seeds
flowering rush <i>Butomus umbellatus</i>	perennial	forb	rhizomes, seeds
whitetop <i>Cardaria draba</i>	perennial	forb	rhizomes, seeds
musk thistle <i>Carduus nutans</i>	biennial, perennial	forb	seeds
diffuse knapweed <i>Centaurea diffusa</i>	annual, perennial	forb	seeds
meadow knapweed <i>Centaurea nigrescens</i>	perennial	forb	seeds
yellow starthistle <i>Centaurea solstitialis</i>	annual	forb	seeds
spotted knapweed <i>Centaurea stoebe ssp. micranthos</i>	biennial, perennial	forb	seeds
rush skeletonweed <i>Chondrilla juncea</i>	perennial	forb	rhizomes, seeds
Canada thistle <i>Cirsium arvense</i>	perennial	forb	rhizomes, seeds
bull thistle <i>Cirsium vulgare</i>	biennial	forb	seeds
poison hemlock <i>Conium maculatum</i>	biennial	forb	seeds
field bindweed <i>Convolvulus arvensis</i>	perennial	forb, vine	rhizomes, seeds
houndstongue <i>Cynoglossum officinale</i>	biennial	forb	seeds
Scotch broom <i>Cytisus scoparius</i>	perennial	shrub	seeds
blueweed <i>Echium vulgare</i>	annual, biennial	forb	seeds
Russian olive <i>Elaeagnus angustifolia</i>	perennial	tree	rhizomes, seeds
leafy spurge <i>Euphorbia esula</i>	perennial	forb	rhizomes, seeds
orange hawkweed <i>Hieracium aurantiacum</i>	perennial	forb	rhizomes, seeds, stolons
meadow hawkweed <i>Hieracium caespitosum</i>	perennial	forb	rhizomes, seeds, stolons
meadow hawkweed <i>Hieracium floribundum</i>	perennial	forb	rhizomes, seeds, stolons
meadow hawkweed <i>Hieracium piloselloides</i>	perennial	forb	seeds
Hydrilla <i>Hydrilla verticillata</i>	perennial	forb	rhizomes, seeds
black henbane <i>Hyoscyamus niger</i>	annual, biennial	forb	seeds
St. Johnswort <i>Hypericum perforatum</i>	biennial, perennial	forb	rhizomes, seeds

SPECIES NAME ^{1,2}	SPECIES BACKGROUND ¹		
	LIFE SPAN	GROWTH HABIT	REPRODUCTIVE MECHANISMS
yellowflag iris <i>Iris pseudacorus</i>	perennial	forb	rhizomes, seeds, stolons
Dyer's woad <i>Isatis tinctoria</i>	biennial, perennial	forb	seeds
field scabiosa <i>Knautia arvensis</i>	annual, perennial	forb	seeds
perennial pepperweed <i>Lepidium latifolium</i>	perennial	forb	rhizomes, seeds
oxeye daisy <i>Leucanthemum vulgare</i>	perennial	forb	rhizomes, seeds
Dalmatian toadflax <i>Linaria dalmatica</i>	perennial	forb	rhizomes, seeds
yellow toadflax <i>Linaria vulgaris</i>	perennial	forb	rhizomes, seeds
purple loosestrife <i>Lythrum salicaria</i>	perennial	forb, subshrub	rhizomes, seeds
purple loosestrife <i>Lythrum virgatum</i>	perennial	forb, subshrub	rhizomes, seeds
Eurasian watermilfoil <i>Myriophyllum spicatum</i>	perennial	forb	stem fragments
Scotch thistle <i>Onopordum acanthium</i>	perennial	forb	rhizomes, seeds
Japanese knotweed <i>Polygonum cuspidatum</i>	perennial	forb, subshrub	rhizomes, seeds
Himalayan knotweed <i>Polygonum polystachyum</i>	perennial	forb	rhizomes, seeds
giant knotweed <i>Polygonum sachalinense</i>	perennial	forb	rhizomes, seeds
sulfur cinquefoil <i>Potentilla recta</i>	perennial	forb	seeds
curlleaf pondweed <i>Potamogeton crispus</i>	perennial	forb	rhizomes, seeds
tall buttercup <i>Ranunculus acris</i>	perennial	forb	seeds
tansy ragwort <i>Senecio jacobaea</i>	perennial	forb	seeds
saltcedar <i>Tamarix ssp.</i>	perennial	shrub, tree	rhizomes, seeds
common tansy <i>Tanacetum vulgare</i>	perennial	forb	rhizomes, seeds
common mullein <i>Verbascum thapsus</i>	biennial	forb	seeds

Sources: Whitson 2000 and USFS 2012¹; MDA 2012 and Gallatin County 2011²

TABLE 3 HERBICIDE PERMITTED FOR TREATING WEEDS ON GNF LANDS AS OF 2012

ACTIVE INGREDIENTS	GENERAL EFFECTS TO VEGETATION	TARGET SPECIES ¹	TRADE NAME ¹
2,4-D	2,4-D is a plant growth regulator and acts as a synthetic auxin hormone. Broad-leaved plants are more susceptible than narrow-leaved plants like grasses.	thistles, sulfur cinquefoil, Dyer's woad, knapweeds, purple loosestrife, tall buttercup, whitetop, hawkweeds	Hi-Dep®, Weedar 64®, Weed RHAP®, Amine 4®, Aqua-Kleen
Aminopyralid	A selective herbicide used on perennial broadleaf weeds.	thistles, sulfur cinquefoil, Dyer's woad, knapweeds, purple loosestrife, tall buttercup, whitetop, oxeye daisy, hawkweeds	Milestone®
chlorsulfuron	A selective herbicide used on perennial broadleaf weeds and grasses.	dyer's woad, thistles, common tansy, houndstongue, whitetop, tall buttercup	Telar®
clopyralid	Selective post-emergence herbicide used to control broadleaf forbs; recommended for big game wintering range to reduce potential forage loss.	thistles, yellow starthistle, hawkweeds, knapweeds, rush skeletonweed, oxeye daisy	Stringer®, Curtail®, Transline®, Redeem®
dicamba	A growth-regulating herbicide readily absorbed and translocated from either roots or foliage. This herbicide produces effects similar to those found with 2,4-D.	houndstongue, yellow starthistle, hawkweed, oxeye daisy, tall buttercup, blueweed, leafy spurge, tansy ragwort, knapweeds	Banvel®, Clarity®, others
glyphosate	A nonselective systemic herbicide that can damage all groups or families of non-target plants to varying degrees.	purple loosestrife, field bindweed, yellow starthistle, thistles, toadflax	Roundup®, Rodeo®, Accord®, Glyphomate®
hexazinone	A foliar or soil-applied herbicide used for managing broadleaf forb, brush, and grass species in non-cropland and in forest lands.	oxeye daisy, yellow starthistle, thistles	Velpar®, Pronone 10G®
imazapic	Selective, systemic herbicide that can be applied pre- or post-emergence to broadleaf forbs and grasses. Its mode of action is associated with the synthesis of branch-chained amino acids.	leafy spurge, toadflax	Plateau®
imazapyr	Broad-spectrum herbicide can be applied pre- or post-emergence. Kills plants within two to four weeks with residual activity. Currently registered for use in non-crop areas such as industrial sites and ROW.	Dyer's woad, field bindweed	Arsenal®, Chopper®
metsulfuron methyl	Selective herbicide used pre- and post-emergence in the control of many annual and perennial weeds and woody plants.	houndstongue, thistle, sulfur cinquefoil, Dyer's woad, purple loosestrife, common tansy, whitetop, blueweed	Escort, Ally
picloram	Picloram is more toxic to broadleaf and woody plants than grains or grasses.	thistles, yellow starthistle, hawkweeds, knapweeds, rush skeleton weed, common tansy, toadflax, leafy spurge	Tordon®, Grazon®, Pathway®
sulfometuron methyl	Broad-spectrum herbicide that can be used pre- or post-emergence. Phototoxic at very low rates.	whitetop, oxeye daisy, tansy ragwort, musk thistle	Oust®
triclopyr	Targets broad-leaf weeds and persists in soil for up to one year.	hawkweed, sulfur cinquefoil, purple loosestrife, knapweed, oxeye daisy, thistle	Garlon®, Redeem®, Remedy®

Source: USFS 2005¹

EXAMPLE OF HERBICIDE TREATMENT AND MONITORING FORM

2012 DAILY HERBICIDE APPLICATION RECORD			
*FACTS ACTIVITY UNIT: _____		*SUBUNIT: _____	
SITE: (Brief description of location, or GPS) _____			
Map on back _____			
*County	Gallatin Madison Park Sweet Grass	*Weed species (select all treated)	*Site IDs (list all treated):
		ANAR6 scentless chamomile	EX: 011107CEBI2001
		ANTI golden chamomile	_____
		ACRE3 Russian knapweed	_____
*Operator Name/License#		BEIN2 hoary alyssum	_____
		BRTE cheatgrass	_____
*Fund Code		CAAC plumeless thistle	_____
		CADR w hitetop	_____
*Equipment	Backpack sprayer Horse sprayer Mobile ground sprayer	CANU4 musk thistle	_____
		CEBI2 spotted knapweed	_____
		CEDB3 diffuse knapweed	_____
*Site	Admin Campground Forest Irrigation ditch Pasture Rangeland Right-of-Way Riparian Trailhead	CHLE80 oxeye daisy	_____
		CIAR4 Canada thistle	_____
		CIVU bull thistle	_____
		CYOF houndstongue	_____
		EUES leafy spurge	_____
		HIAU orange hawkweed	_____
		HYNI black henbane	_____
		HYPE St. Johnswort	_____
*Ownership	USFS Other: _____	KNAR field scabious	_____
		LIDA dalmation toadflax	_____
		LIVU2 yellow toadflax	_____
*Date	____ / ____ / 2012	PORE5 sulfur cinquefoil	_____
		RAAC3 tall buttercup	_____
*Time	____ Start ____ Finish	TAVU common tansy	_____
		VETH common mullein	_____
		Other _____	_____
Temp	_____		_____
Wind speed	_____		_____
Wind direction	N NW W SW S SE E	Calibrated Volume (Required if using product rate below)	_____ Gal/Acre
*Application Area (Acres treated, wet acres)	_____ Acres	*Application Amount (Total gallons of tank mix sprayed)	_____ Gallons
Tank Mix	*Name	*Product Rate (also state Calibrated Volume above)	OR *% Solution
Herbicide 1		_____ Oz/Acre	
Herbicide 2		_____ Oz/Acre	
Herbicide 3		_____ Oz/Acre	
Adjuvant		_____ Oz/Acre	

B. RECLAMATION GUIDELINES

The proposed upgraded transmission line passes through approximately 16 miles of NFS lands between Gallatin Valley and Big Sky. Along the way this corridor transects a wide range of different geologic materials, landforms, and terrain features. These, in turn, directly affect other environmental attributes such as predominant soil properties, existing native plant communities, inherent site productivity, suitability of selected reclamation species, and the likelihood that specific weed species will invade disturbed sites. All of the above factors are inter-related. It is unreasonable to believe that a single seed mix or single reclamation strategy will be best suited for all portions of the transmission line corridor.

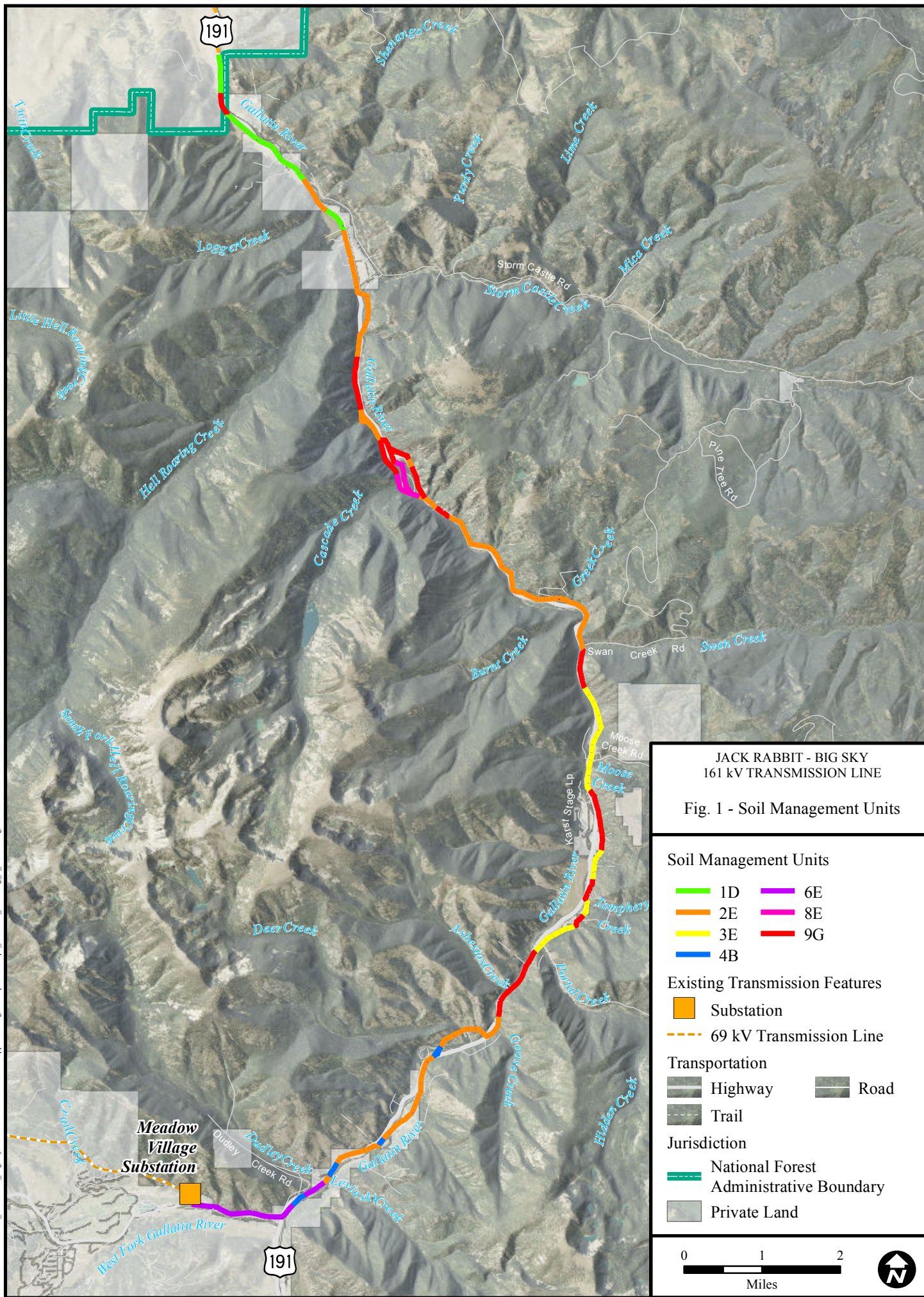
Much of the disturbance associated with upgrading the transmission line to Big Sky will be largely cosmetic. Vegetation will be cleared along the ROW, other vegetation will be partially crushed or laid down by limited overland travel, and existing forest roads and dirt two-tracks will be used. In these areas, reclamation will amount to letting the existing vegetation recover naturally.

In other areas, disturbances will require direct remediation. These may include: detrimental soil compaction due to repeated overland travel or use of stockpile areas; rutting in wet areas or on strongly sloping or steeper slopes; areas of noticeable soil erosion; any enhancements made to temporary roads or trails; and excavations used to install the transmission line poles or other infrastructure. For these disturbances, the goal will be to effectively remediate detrimental soil disturbance (DSD) caused by the project, while minimizing the creation of any additional remediation caused soil disturbance. The Region One DSD standard limiting DSD to less than 15 percent in project areas has not been applied in the assessment of this project. Underlying principles of protecting forest resources and maintaining forest health, however, still apply. The discussion that follows focuses on those areas where remediation and successful re-establishment of native or existing non-native vegetation will be required.

Seeding Strategies

In order to simplify seed mixes and avoid the use of highly aggressive native or introduced species, the approach recommended here adjusts reclamation techniques and seed mixes to match existing environmental site conditions within reasonable limits. Along these lines, seven Soil Management Units have been identified in the soil and landscape analysis for this project. The soil-landscape basis for these units is discussed in the Soils section of Chapter 3 (3.4.5) of this EIS. Locations of the different landscape units along the transmission line corridor are shown in Figure 1. Details of specific land remediation/site preparation techniques have been added to the Sources of Soil Disturbance portion of the Soils section in Chapter 3 and are also included in the Applicable GNF Soil Best Management Practices in Appendix D.

Regardless of the approach taken, a critical component of all remediation practices will be to adequately control weed species prior to disturbance, and maintaining weed control during the establishment period while desired species take hold on disturbed sites.



Seed Mixes and Agronomic Practices

Four potential native grass seed mixes are proposed for use along the transmission line corridor based on the range of soil and landscape attributes present within the project area. Three of these seed mixes are related in that they start with the same upland grass species base of bluebunch wheatgrass and Idaho fescue. Supplemental species are added to provide greater specificity to different soil and landscape conditions. For two of the seed mixes, there are alternative reclamation strategies that could eliminate the need for these mixes. Table 4 Provides details of where each seed mix would be used.

TABLE 4 SUMMARY OF SEED MIXES AND THE ENVIRONMENTAL CONDITIONS IN WHICH THEY SHOULD BE USED

SEED MIX	ENVIRONMENT	SOIL MGT. UNIT(S)
#1	Grasslands and open woodlands throughout most of Gallatin Canyon	3E, 4B
#2	Open Douglas-fir woodlands on south facing hillside along Big Sky road	6E
#3*	Conifer forests throughout Gallatin Canyon – sandy or sandy-skeletal soils	2E, 8E, (9G)
#4**	Fertile, loess-capped meadows in the north end of Gallatin Canyon	1D

*Use of natural recovery possible, provided adequate weed control exists prior to disturbance and throughout the establishment period.

** Recommended alternative uses field barley with slender wheatgrass to occupy sites that will inevitably be re-colonized by smooth brome (see below).

Primary seed mixes include a general mix (#1) for both grassland and open woodland areas throughout much of Gallatin Canyon (Units 3E and 4B) and a separate modified seed mix (#2) for open Douglas-fir woodland/grasslands on south aspects along the north side of the Big Sky cut-off road (Unit 6E). Differences between these two seed mixes reflect drastic differences in soils due to different soil parent materials, as well as differences in soil moisture/temperature relations resulting from the predominant aspects present.

Two other potential native seed mixes are proposed, although they may not be needed. This will depend on the suitability of alternative reclamation strategies proposed. The third seed mix (#3) is for areas of for very coarse (often stony or very stony with predominantly sand soil textures), forested soils that occur throughout most of Gallatin Canyon. These soils have formed primarily from metamorphic gneiss (Units 2E and 9G) or in glacial till with a strong metamorphic gneiss influence (Unit 8E). The final native seed mix (#4) is for use on the somewhat unique pastures in the northern portion of Gallatin Canyon. Grassland soils in this area are highly fertile in large part due to loess deposition over coarse textured substrates (Unit 1D). Open meadows in these areas are mainly dominated by introduced smooth brome with some large patches of snowberry present. Alternative re-vegetation strategies for these last two areas are discussed below.

Seed Mix #1 – Grassland and Open Woodland Areas throughout Much of Gallatin Canyon

- 30 % - Bluebunch wheatgrass (*Pseudoroegneria spicata*) var. Anatone and Goldar
- 30 % - Idaho fescue (*Festuca idahoensis*) var. Joseph
- 30 % - Mountain Brome (*Bromus marginatus*) var. Garnet
- 10 % - Slender wheatgrass (*Elymus trachycaulus*) var. Pryor

Potential Substitute:

- 10 % Thickspike wheatgrass (*Elymus lanceolatus*) var. Critana to replace 10% mountain brome

Seed Mix #2 – Open Douglas-fir woodland on south-facing slopes above the road to Big Sky

- 30 % - Bluebunch wheatgrass (*Pseudoroegneria spicata*) var. Anatone and Goldar
- 20 % - Idaho fescue (*Fetuca idahoensis*) var. Joseph
- 30 % - Western wheatgrass (*Pascopyrum smithii*) var. Rosana
- 10 % - Big bluegrass (*Poa secunda* spp. *Ampla*) var. Sherman
- 10 % - Prairie junegrass (*Koeleria macrantha*) var. Barkoel

Potential Substitute:

- 10 % - Green needlegrass (*Nassella viridula*) var. Lodorm to replace 10 % Idaho Fescue

Seed Mix #3 – Coarse textured forest understory areas if inadequate weed control or topsoil not salvaged

- 30 % - Bluebunch wheatgrass (*Pseudoroegneria spicata*) var. Anatone and Goldar
- 30 % - Idaho fescue (*Fetuca idahoensis*) var. Joseph
- 20 % - Big bluegrass (*Poa secunda*) var. Sherman
- 20 % - Thickspike wheatgrass (*Elymus lanceolatus*) Critana

Alternative approach: Natural regeneration from propagules in topsoil.

Seed Mix #4 – Loess-capped fertile grasslands in North end of Gallatin Canyon

- 50 % - Mountain Brome (*Bromus marginatus*) var. Garnet
- 30 % - Big bluegrass (*Poa secunda*) var. Sherman
- 20 % - Slender wheatgrass (*Elymus trachycaulus*) var. Pryor

Alternative Approach - Seed Mix #4 Alt.

- 20 pounds per acre (lbs/acre) - Field barley (*Hordeum vulgare*)
- 5 lbs/acre - Slender wheatgrass (*Elymus trachycaulus*) var. Pryor

TABLE 5 SUMMARY OF PROPOSED SEED MIXES IN PERCENT BY SPECIES TO BE USED IN RE-VEGETATING DETRIMENTAL SOIL DISTURBANCES ALONG DIFFERENT PORTIONS OF THE TRANSMISSION LINE CORRIDOR

GRASS SPECIES	CULTIVAR	SEED MIX				
		#1	#2	#3	#4	#4 ALT.
Bluebunch wheatgrass	Goldar and Anatone	30	30	30		
Idaho fescue	Joseph	30	20 (10)	30		
Mountain brome	Garnet	30 (20)			50	
Slender wheatgrass	Pryor	10			20	5 lbs/ac.
Thickspike wheatgrass	Critana	(10)		20		
Western wheatgrass	Rosana		30			
Big bluegrass	Sherman		10	20	30	
Prairie junegrass	Barkoel		10			
Green needlegrass	Lodorm		(10)			
Field barley	Locally avail.					20 lbs/ac.

- See Table 4 and text above for applicability to different landscapes

- Seed mix #3 is to be used top soil salvaging was not conducted and/or if adequate weed control was not obtained prior to disturbance or cannot be maintained and during the re-establishment period.

- Preferred alternative is to use a temporary barley-slender wheatgrass seeding if re-establishment of smooth brome on these sites is inevitable.

Special Cases

Coarse-Textured, Forested Soils Formed from Gneiss (Includes Units 2E, 8E, and portions of Unit 9G)

Understory vegetation in closed canopy or partially closed conifer forest areas is largely dominated by shrubs and forbs. Pinegrass is the primary grass species present with areas of bluebunch wheatgrass and Idaho fescue. Unfortunately, pinegrass seed is not commercially available. Common native shrub and forb species include: white spirea, woods rose, Oregon grape, Vaccinium species, showy aster, Erigeron species, heartleaf arnica, and strawberry. If topsoil is appropriately salvaged separately at excavation sites and later replaced at the surface, many of the rootstocks and other propagules from these species will remain viable in the soil to re-vegetate the site with native vegetation. This approach can only work, however, with suitable topsoil salvaging and good weed control prior to disturbance and during the establishment period. Use of wood chips, if available in less steeply sloping areas and/or slashing with available conifer boughs or young trees will enhance success.

If the above topsoil salvaging and weed free conditions cannot be met, then Seed Mix #3 should be broadcast seeded over disturbed areas as soon as possible after site prep has been completed. Follow-up weed treatments will be a must, specifically for spotted knapweed which will be highly competitive on the coarse-textured soils in these areas especially when the conifer overstory is removed or thinned too heavily.

Fertile, Loess Capped Grassland Soils in the North End of Gallatin Canyon (Unit 1D)

These open meadows are primarily dominated by the introduced smooth brome grass and are most often used as horse pastures. Regardless of what is seeded, the strongly rhizomatous smooth brome will almost inevitably re-colonize these sites in a short period of time. An inordinate amount of time and energy would need to be expended to eradicate smooth brome from these sites. The preferred strategy on these sites should likely be to maintain weed control until smooth brome has re-colonized disturbed areas. Weed control during the interim could be enhanced by initial drill seeding, no-till or traditional, of 20 lbs/acre barley along with 5 lbs/acre of slender wheatgrass (Mix #4 Alt.) into major disturbances in these areas. Adding slender wheatgrass to the mix provides a somewhat longer time period of site protection than barley alone. A figure-8 harrow or no-till seeding pattern can be used in strongly sloping areas to help control water erosion. Slopes on much of these areas are nearly level to gently sloping. Water erosion will not be a problem in lower slope areas. On slopes greater than eight percent, some erosion control measures will be required if drill seeding is used.

A native grass mixture of competitive perennial grasses (Mix #4) including mountain brome, big bluegrass, and slender wheatgrass could be used to potentially compete with the existing smooth brome if that were the preferred alternative. Success in that regard, however, is doubtful at best. Weed control will remain an important component of reclaiming disturbed sites in these areas in any event.

C. IMPLEMENTATION GUIDELINES

Unless otherwise noted, use approximately 20 pounds per acre of the appropriate native seed mix, broadcast on sites to be re-vegetated. Seeding should occur as soon after the seedbed has been prepared as possible. This can be accomplished in either the spring or fall. Spring seeding needs to be conducted as early as possible to maximize the benefits of extra moisture in the soil. Fertilizer will not be used. Seed will be purchased in accordance with pure live seed specifications for seed mixtures, and will only include weed-free certified seed. Proof-of-purchase of certified weed-free hay, mulch, native seed, and other materials used will be provided to the Forest Service and approved by the contracting officer before materials are brought on Forest Service land.

Site preparation depends on the type of disturbance to be remediated. In all instances, however, site preparation starts with obtaining adequate weed control prior to disturbance and again prior to seeding, as needed. For excavations, site preparation includes salvaging the topsoil during excavation in accordance with GNF Best Management Practices (BMPs) for excavations of limited extent. Salvaged topsoil will be replaced at the surface during backfilling and the surface left rough, creating microsites for seed. Broadcast seeding will be used in most instances. After seeding, the site will be lightly raked and where reasonable, the soil packed to ensure good soil-seed contact.

Areas of detrimental compaction or rutting that need to be re-vegetated due to overland travel on access routes or in stockpile or work areas will not be plowed. Instead, the top 6 to 8 inches will be ripped with a single pass of a 10- to 12-foot wide toolbar with 3 to 5 shanks on it that is dragged behind either a tractor or backhoe. Relative to plowing, the toolbar with shanks reduces the amount of remediation caused disturbance while allowing water to infiltrate into the soil. Exposed bare soil will be broadcast seeded as per above with the appropriate seed mix, lightly raked, and where reasonable packed to ensure good soil seed contact. Erosion control measures will be taken in strongly sloping or steeper areas, as needed, based on GNF BMPs for controlling soil erosion by water. Over time, the action of plant roots, freezing and thawing, wetting and drying, and micro and macro-invertebrates will loosen the soil adjacent ripped furrows once the overall area of compaction has been opened up.

In some instances where a larger area of disturbances needs to be remediated, drill seeding may be practical in more of a standard plow-plant-pack operation or by using a no-till drill. Such an approach would only be feasible in Soil Management Units 1D and 4B. In all other areas, broadcast seeding would be required as needed. Seeding may not be required for soil disturbances in Soil Management Units 2E, 8E, and 9G where adequate weed control and topsoil salvaging allows for natural re-vegetation to occur.

Reclamation may be required to de-commission temporary dirt roads or along existing dirt 2-tracks that were improved to facilitate the installation of transmission poles. Actual remediation steps will depend on site specific conditions with respect to what needs to be remediated. Details of those steps will not be covered here other than to state that all non-system roads requiring site restoration will be restored according to established GNF standards and BMPs.

Wetland Reclamation

The total area of wetland through which the transmission line corridor passes is limited to approximately two acres for all alternatives. It is anticipated that these areas can, for the most part, be avoided during installation of the upgraded transmission line facilities. The best remediation in wetland areas is to avoid detrimental disturbance at the start. Number one in the list of generic BMPs that NorthWestern will employ is that “wetland matting will be used if wetlands need to be crossed while accessing transmission

structure locations.” This should eliminate or at least reduce most potential detrimental soil disturbance in wetlands associated with soil compaction or rutting.

In the event, a transmission pole needs to be installed in a wetland, topsoil salvaging will be conducted in accordance to current GNF BMPs for excavations of limited extent. Upon topsoil replacement, the disturbed site will be re-vegetated with appropriate wetland vegetation. This vegetation could be collected onsite for a limited area or can be purchased locally as plugs or cuttings.

Post-Treatment Monitoring

Forbs and shrubs have deliberately been left out of all seed mixes because of the expectation that chemical weed control at disturbed sites along the upgraded transmission line will be ongoing in most areas. Weed control remains of primary important importance in the re-establishment of native-based plant communities on disturbed sites in the GNF. That importance continues into the monitoring period for all disturbed sites. At a later date, the Forest Service may consider interseeding forbs and/or shrubs into selected disturbed sites if natural re-colonization does not occur.

Disturbed sites that require re-vegetation will be monitored over time to ensure the reclamation is successful. During monitoring, both the successful establishment of target species and exclusion of noxious weeds will be used as criteria for assessing reclamation success. Random transects across seeded or natural re-vegetation sites will be used to assess re-vegetation condition. Selected sites will be monitored in years 1, 3 and 5 after reclamation has been completed. In part, this is so the GNF can judge the suitability of different reclamation techniques and seed mixes used on this project to enhance future success on other remediation projects. Two successive failures at a site, however, will require a consultation between the Forest Service and NorthWestern to determine an appropriate course of action to achieve successful reclamation results. Immediate responses to restoration failures on disturbed sites are noted in Table 6 below.

TABLE 6 RE-VEGETATION MONITORING CRITERIA AND POTENTIAL MANAGEMENT RESPONSES AS A FUNCTION OF TIME FROM INITIAL SITE REMEDIATION AND SEEDING OR START OF NATURAL RE-COLONIZATION OF UNSEEDED SITES

TIME FROM SEEDING (YRS.)	MONITORING CRITERIA		REMEDATION MEASURES IF FAILURE TO MEET CRITERIA
	TARGET SPECIES EST.	NOXIOUS WEEDS/SQ. FT.	
1	3 seedlings/sq. ft.	0	Weed control
3	20% canopy coverage	0	Weed control, interseed
5	30% canopy coverage	0.1	Weed control, reseed

Table 6 provides specific criteria as a function of time since treatment for assessing re-vegetation success or failure. Included also are follow-up remediation steps to be taken if suitability criteria are not met. Additional steps may need to be taken in cases of abject failures. Consultation between the Forest Service and NorthWestern will be required at that time along with follow-up sampling by the Soil Scientist for the GNF to determine if the re-constructed soil resource at a site is capable of supporting the kind of native vegetation occupying the immediate surrounding area, i.e. was a suitable soil resource retained. Any additional appropriate remediation steps will be decided on at that time.